Center Independent Research & Development: GSFC IRAD

Tuning range multiplication of a precision and fast tunable seed-laser system

Completed Technology Project (2013 - 2014)

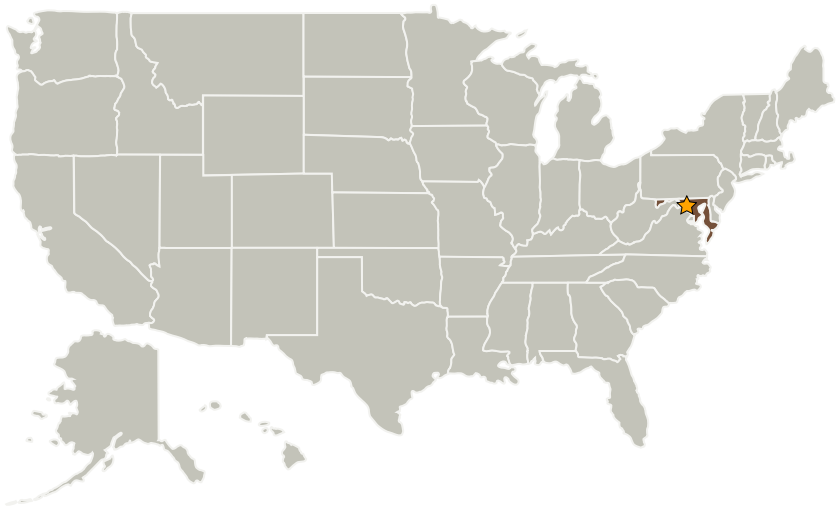
Project Introduction

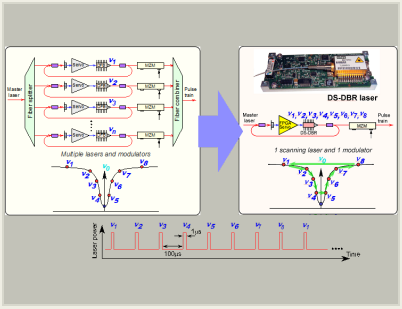
This project develops a high precision and fast tunable laser technology for Earth and planetary Science missions to measure atmospheric constituents (such as CO2, methane, and CO) and parameters (such as surface pressure and wind velocities). CO2, methane, and CO are significant greenhouse trace gases. Missions to globally measure these gases are recommended in the NRC Decadal Survey to close the carbon budget. Our technology overcomes major problems with current state of the art and enables critical capabilities for these decadal missions and similar missions on alternative platforms, such as the Global Hawk UAV or the International Space Station. To meet the unprecedented precision targets of these missions, pulsed lidar sounding techniques are being developed to measure the two-way absorption spectra of target species from the spacecraft to the surface and back. The proposed technology can be readily applied to other wavelengths for other species. The proposed work will result in a novel transmitter technology that can: Significantly lower cost (by >50%), size, mass, and power consumption of the transmitter; scan an arbitrary number of programmable wavelengths and even multiple species/lines with a single tunable laser, which is not possible with existing technologies; improve the transmitter reliability by reducing parts counts and gas cell instability; improve the measurement precision by eliminating unwanted spectral crosstalk; leverage mature technologies/Telcordia qualified components to accelerate the TRL.

Anticipated Benefits

N/A

Primary U.S. Work Locations and Key Partners





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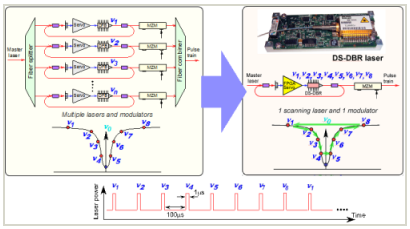
Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
University of Maryland-College Park(UMCP)	Supporting Organization	Academia	College Park, Maryland

Primary U.S. Work Locations
Maryland

Images



Tuning range multiplication of a precision and fast tunable seed-laser system Project
Tuning range multiplication of a precision and fast tunable seed-laser system Project
(https://techport.nasa.gov/image/3989)

Links

GSC-17011-1
(https://ntts.arc.nasa.gov/app/)

Project Website:

http://sciences.gsfc.nasa.gov/sed/

Organizational Responsibility

Responsible Mission Directorate:
Mission Support Directorate (MSD)

Lead Center / Facility:
Goddard Space Flight Center (GSFC)

Responsible Program:
Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:
Peter M Hughes

Project Manager:
Terry Doiron

Principal Investigator:
Jeffrey R Chen

Co-Investigators:
Haris Riris
Kenji Numata
Guangning Yang
Stewart T Wu

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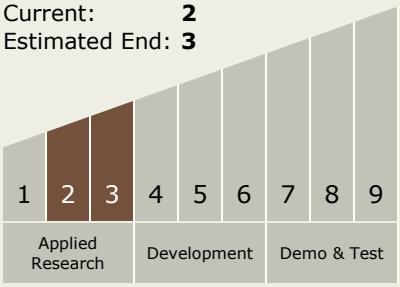
Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers